

it affords. But it is also possible that they may represent unfortunate animals that had ages ago wandered into the dark recesses of the cave, and in the total absence of light, and consequent disuse of their visual organs, these organs may have become obliterated, or where their forms remain, they may have become incapable of performing their functions. In such an inquiry, the author remarked, that, like the animals themselves, we grope in the dark.

MISCELLANEOUS.

On the Anatomy of Terebratula australis. By M. P. GRATIOLET.

1. *The muscles which move the shell.*—The Brachiopoda are destitute of the sort of spring which opens the shells of the Lamelli-branchiate Mollusca. Cuvier in his work on *Lingula* supposed that they separated the valves by means of their arms. This explanation has been adopted by Owen, Blainville, and Siebold. D'Orbigny has put forward the opinion within the last few years, that the movement which separates the valves might be explained by the action of the corneous cilia with which the edges of the mantle are furnished.

The author's examination of some specimens of *Terebratula australis* leads him to support the views announced by Quenstedt as early as 1835, that the shell of these animals is opened by the action of certain special muscles, which he calls *diductors*. These muscles are attached to the cardinal process (*talon*) of the imperforate valve behind the point of articulation of the valves; they raise this cardinal process, and consequently depress the other extremity of the lever. Thus there are muscles to close the shell and others to open it. This is peculiar to the Brachiopoda, and occurs in all the genera of which the anatomy is known.

[The true action of these muscles, called by Professor Owen *Adductores breves*, and by Mr. Davidson *Cardinal muscles*, is well known in this country, having been pointed out by Mr. Woodward in 1851. The question of the real nature of those processes of the mantle which M. Gratiolet calls 'branchial papillæ,' but which are assuredly not branchial, will be found fully discussed by Dr. Carpenter, "On the intimate structure of the Shells of the Brachiopoda," Palæontographical Society, 1853.]

Besides these muscles there are four symmetrical and very fleshy muscles which pass from the valves to the peduncle. These muscles cause the various movements of the shell upon its stalk.

2. *The mantle.*—The structure of the mantle is remarkable. Its edges are furnished with a crown of corneous cilia, finely annulated, and originating in follicles, like true hairs. A circular muscle and small radiating fibres move these ciliated margins.

The internal lamina of the mantle is smooth and scarcely vascular, which is the reverse of what takes place in the *Lingula* and *Orbicula*; on the other hand, the outer lamina is rich in vessels and covered with branchial papillæ which are inserted in the innumerable perforations.

rations with which the shell is pierced. These facts establish a characteristic difference between the *Terebratulæ* and the Lamelli-branchiate Mollusca, and justify the denomination of *Palliobranchiata* which has been bestowed upon the *Brachiopoda*.

3. *The arms.*—The large stiff canal which serves as their base is in communication with the cavity of the body, but it has no connexion with the capillary tubes of the fringes. These tubes are connected with delicate canals which run beneath the base of the fringes, and by means of which the erection of the tubular threads is produced. The organization of these arms does not justify our attributing to them very extended movements, which, moreover, agrees with the direct observations of Quoy and Gaimard. The author found no traces in this animal of the retractor muscle of the arm so apparent in the *Orbiculæ* and *Lingulæ*.

4. *Digestive apparatus.*—The mouth is a small opening bordered on one side by the fringe of the arms, and on the other by a small lip which is not ciliated, and which is continued on each side through the whole length of the fringe as far as the extremity of the median arm. The anus does not open upon the side of the animal, as has been stated, but on the middle near the bottom of the perforated valve.

5. *Vascular system.*—The large venous sinuses of the body send off long processes (four to each lobe of the mantle). These processes furnish no vessels of any kind to the inner surface of the mantle; they ramify exclusively in its margin. From this marginal plexus the vascular ramifications which form the branchial network of the outer lamina originate. The branchial veins which collect the blood from this network carry it to the auricle of the two hearts; this auricle does not open into the sinuses of the cavity of the body, as has been stated; it is exclusively branchial, as is the case in all Mollusca.

6. *Nervous system.*—The centre of the nervous system of *Terebratula australis* consists of a quadrilateral collar which surrounds the œsophagus. The side of the collar which is beneath the fringed lip is the thickest. From the angles arise long nerves which ramify in the pallial lobes, and especially in the margin. The author could not perceive the nerves of the arms. The same structure is found in *Lingula*.

7. *Generative apparatus.*—The male and female organs are not mingled with the granulations of the liver, as has been stated from analogy with what exists in *Orbicula* and *Lingula*. They consist of small cæca attached in great numbers to a sort of mesentery, and float in the interior of the pallial venous sinuses. The author supposes that the ova of the females and the seminal fluid of the males escape by canals opened on the inner surface of the mantle.—*Comptes Rendus*, July 11, 1853, p. 45.

ON THE TEETH OF PERONIA AND OTINA.

In the 'Annals' for November 1853, I described the teeth of the genus *Peronia* as exactly similar to those of *Testacellus*; they were described from a slide mounted by Mr. Wilton, shown to me by

Mr. S. P. Woodward. Having since had an opportunity of examining the teeth of *Peronia mauritiana*, I find them similar to those of *Oncidium*, *Helicidæ*, &c. I am convinced that the slide so named must have been taken from a *Testacellus*, which Mr. Woodward now considers probable: the number attached to the specimens from which it was taken may have been misplaced, and there were both *Peronia* and *Testacellus* in the lot of animals examined by Mr. Wilton. The family *Peroniadæ* must therefore be abolished. This observation is interesting, as it gets rid of the apparent anomaly of the teeth of two allied genera being different.

Mr. Alder has most kindly sent me a series of drawings of the teeth of British Mollusca to examine; among other interesting specimens is that of *Otina otis*, which he describes as having "about ten rows of sixty teeth in each row." From the similarity of these teeth to those of other Pulmonata, I have little doubt that this mollusk, which has been placed in various parts of the system and in different families, will prove to be a marine species of *Auriculidæ*, like *Voluta alba* and *V. biplicata*.—J. E. GRAY.

HABITS OF BIRDS.

In all works on Natural History, we constantly find details of the marvellous adaptation of animals to their food, their habits, and the localities in which they are found. But naturalists are now beginning to look beyond this, and to see that there must be some other principle regulating the infinitely varied forms of animal life. It must strike every one, that the numbers of birds and insects of different groups, having scarcely any resemblance to each other, which yet feed on the same food and inhabit the same localities, cannot have been so differently constructed and adorned for that purpose alone. Thus the goatsuckers, the swallows, the tyrant flycatchers, and the jacamars, all use the same kind of food, and procure it in the same manner: they all capture insects on the wing, yet how entirely different is the structure and the whole appearance of these birds! The swallows, with their powerful wings, are almost entirely inhabitants of the air; the goatsuckers, nearly allied to them, but of a much weaker structure, and with largely-developed eyes, are semi-nocturnal birds, sometimes flying in the evening in company with the swallows, but most frequently settling on the ground, seizing their prey by short flights from it, and then returning to the same spot. The flycatchers are strong-legged, but short-winged birds, which can perch, but cannot fly with the ease of the swallows: they generally seat themselves on a bare tree, and from it watch for any insects which may come within reach of a short swoop, and which their broad bills and wide gape enable them to seize. But with the jacamars this is not the case: their bills are long and pointed—in fact, a weak kingfisher's bill—yet they have similar habits to the preceding; they sit on branches in open parts of the forest, from thence flying after insects, which they catch on the wing, and then return to their former station to devour them. Then there are the trogons, with a strong serrated bill, which have similar habits: and the little humming-

birds, though they generally procure insects from the flowers, often take them on the wing, like any other fissirostral bird.

What birds can have their bills more peculiarly formed than the ibis, the spoonbill, and the heron? Yet they may be seen side by side, picking up the same food from the shallow water on the beach; and on opening their stomachs, we find the same little crustacea and shell-fish in them all. Then among the fruit-eating birds, there are pigeons, parrots, toucans and chatterers,—families as distinct and widely separated as possible,—which yet may be often seen feeding all together on the same tree; for in the forests of South America, certain fruits are favourites with almost every kind of fruit-eating bird. It has been assumed by some writers on natural history, that every wild fruit is the food of some bird or animal, and that the varied forms and structure of their mouths may be necessitated by the peculiar character of the fruits they are to feed on; but there is more of imagination than fact in this statement: the number of wild fruits furnishing food for birds is very limited, and birds of the most varied structure and of every size will be found visiting the same tree.—*Wallace's Travels on the Amazon and Rio Negro.*

On a species of African Ant. By Dr. L. IMHOFF.

In describing a species of Ant brought from Acropong on the Gold coast by M. Widmann, a Missionary, Dr. Imhoff gives the following account of one of its habits. The ant belongs to the genus *Anomma*, Shuck.

“Amongst the various ants which occur at the Missionary station at Acropong, there is one in particular of which both M. Widmann and his wife have a very vivid recollection. One New Year's night, during their many years' residence in that place, an army of ants, several inches broad, entered their bedroom; the ants scattered themselves in every direction, and spread over all the furniture and other objects in the room; whatever fell in their way was immediately laid hold of; the bed-cover was soon covered with them, until he and his wife could no longer endure the bites of the creatures and were compelled to leave the house. The ants continued to stream through the dwelling in an uninterrupted line for half an hour. This visit was quite unexpected by the inhabitants of the house; they had indeed seen ants in the house before, but only one at a time.”

“This statement agrees remarkably with that made by Reugger in his ‘Reise nach Paraguay.’ The *tajj-ne* of Paraguay, an ant, apparently belonging to the genus *Odontomachus*, is, says he, a species which builds its nest in the earth, and only appears occasionally in houses, but then comes in crowds and quite unexpectedly, breaking through a crack in the wall or between the tiles of the floor. He describes it also as being exceedingly voracious and fond of biting. These ants attack every kind of animal, not excepting man. Crickets, spiders, mantides, which are also to be met with in the rooms, are immediately torn to pieces by them.”

Dr. Imhoff originally proposed the name of *Sphegomyrmex* for